



ARIES MUSIC 77

# ARIES MUSIC

INCORPORATED

An Aries Modular Synthesizer system consists of a number of AR-300 series modules. These modules provide a complete set of basic synthesizer component functions: signal sources; controllers and modifiers; and a growing number of more exotic functions. The 300 series is fully modular, allowing maximum system flexibility. We assume some previous experience with synthesizers on the part of our customers, but are happy to give advice and assistance to those who are getting into electronic music for the first time.

## *It's More Than Another Keyboard*

A synthesizer is a group of relatively simple circuits, each performing a relatively simple task. The way in which these circuits are connected to one another (patched) determines the nature of the 'instrument': the range of sounds and the kinds of controls included. While this is true for all synthesizers, some synthesizers, especially the smaller ones, are pre-patched by the factory — the range of 'instruments' available has been defined and limited, along with the range of musical expression possible.

It's been declared a trade-off, that by giving up the enormous range of choices and controls for a few deemed useful by someone else, you get increased 'performability'. "You just can't make changes fast enough with a modular patch cord system to play on stage." — so goes the argument. Five or six years ago that may have been the case, but it's not true today — Aries 'normalised' patching capability makes it as comfortable to use on stage as it is in the studio. The real trade-off, we feel, is one of instant gratification versus long-term satisfaction. It doesn't take as much effort to learn to play a small pre-set system as it does a modular one — but someone else has done all the exploring for you, left you with the sounds he liked, and you haven't much chance of learning what making music with electronic circuits is really all about. If your interest is in learning to play a completely new instrument, an Aries Modular electronic musical instrument will be a satisfying and economical choice.

## *Aries In The Classroom*

The Aries Modular System is uniquely situated to use in the classroom for several reasons:

- we offer several cabinet sizes; each student can be assigned only the modules he or she needs for a given lab exercise.
- being modular, the system can grow as classroom and composition needs grow.
- it's a patchcord system first, giving the beginning student an easy grasp of the relationship between instrument configuration (patch set-up), the sound produced, and its control parameters.

HERE WE ARE:

BOX 3065 SALEM, MA. 01970 (617) 744-2400



## Patching & Connectors

No distinction is made between "control signals" and "audio signals". This means that any signal from the system can be patched anywhere else in the system without damage, optimizing overall flexibility. The standard connector is the NTT 311 miniature phone jack (equivalent to a Switchcraft 42A miniature phone jack). Patch cords are supplied (10 free per thousand dollars of kits ordered) and are completely reliable. Much has been argued over the years about the reliability of miniature jacks — some manufacturers believe they are not. The fact of the matter is that there doesn't exist the industry-wide standardization of mini's as there is with 1/4" phone jacks — which means that you've got to have the right patch-cords: either NTT or Switchcraft. The space-saving advantages of mini jacks is obvious when you compare panel space requirements of a Moog or Eu modular system to that of an Aries or other type using miniature jacks. All patch cords are shielded to prevent noise or crosstalk.

## Input Structure

Most input impedances are 50K ohms minimum, allowing outputs to drive numerous inputs without significant loading. Most module inputs are summing nodes, which allows easy modification to accommodate additional inputs. Signals at control inputs are summed algebraically.

## Output Structure

Most output impedances are 1K nominally, allowing output mixing simply by shorting outputs together at a multiple. This kind of mixing does not sum signals but gives the average voltage of signals mixed.

## Power Supply

All modules require  $\pm 15$  volt power supplies. For current requirements, consult specific module specifications.

## Building Kits

"Can I build my synthesizer from your kits?" is a familiar question. Our answer is — probably — but this answer depends less on your skill and experience than it does on your ability to work slowly with care and patience. People with no experience whatsoever have completed kits successfully, while people who have done other electronic kits have had problems because they've been careless or hasty. It is helpful to have someone demonstrate soldering to you if you've never tried it.

## Warranty

Assembled units are fully warranted to be free of defects of material or workmanship for 1 year from date of shipment. Just return the defective module to the factory and we'll repair and return it.

Modules purchased as kits will also be repaired at the factory, but there is a \$15.00 service charge for kit repairs. A bit of quick addition will show that even if nothing works, the kit with full repairs will save you some over an assembled unit.

We have once in a while actually replaced kits which were so badly assembled that they were beyond repair, all for \$15.00. Virtually the only thing you can do to void your warranty is to use acid core solder or acid flux (plumbing-type solder). Rosin core solder, 60/40 lead-to-tin ratio is best.

Replacement parts are available from us — write for prices.

## User's Manual

A comprehensive User's Manual is available, written for Aries by Ken L. Perrin of the Boston School of Electronic Music. The Manual covers synthesizer theory in general, and Aries synthesizer operation in particular, in ninety-six thorough pages. We recommend that anyone planning to purchase over \$800. or so in kits or assemblies first purchase and peruse this book. The price of the Manual (\$9.50) is refundable with the placement of an order of \$1000. or more. It is also a useful classroom tool or curriculum guide, coming from one with a good deal of experience in electronic music education.

## Documentation

Documentation kits, which include schematic, wiring diagram, and assembly instructions, on any Aries module are available for \$5.00. This amount will be credited towards the purchase of that module.

## Authorized Dealers

Prices are the same whether ordering from a dealer or direct from the factory, but delivery schedules may vary, as we ship to the dealer unless otherwise directed. All of these dealers are qualified to do custom work, repairs, and modifications to electronic music instruments.

Ron Rivera  
48 Brighton Avenue, #11  
Allston, MA. 02134  
(617) 782-6554

The Boston School of  
Electronic Music  
127 Kilby Road  
Brighton, MA, 02136  
(617) 734-4500

Dana McCarty  
164 West 83rd Street  
New York, New York  
10024  
(212) 787-1378

Carl Frawel  
Gende Electric  
140 Oxford Way  
Santa Cruz, CA. 95060  
(408) 423-1551

# ADSR ENVELOPE GENERATOR

The AR-312 provides the classic four-stage envelope control source with Gate and Trigger logic.

- Output:** A positive D.C. voltage, variable according to:  
 Attack time — governs initial voltage rise to +10v.  
 Decay time — governs change from +10v. to Sustain level voltage  
 Sustain Level — voltage at which signal remains until Gate is removed  
 Release time — governs voltage change from Sustain level to 0v.
- Inputs:** Gate — positive-going edge initiates Attack, Decay and Sustain follow as designated; negative-going edge initiates Release. A sharply rising and falling voltage of at least 2v. peak is required, such as square wave or keyboard Gate.  
 Trigger — initiates new Attack if Gate is still present. This permits legato keyboard playing where each key initiates a new envelope before the first has finished.

The ADSR output may be used to control any v.s. parameter in the synthesizer, and is most commonly associated with VCA and VCF control. In that manner, the ADSR provides four significant controls over dynamics of sound. This is important, as recognition of sounds by the human ear depends more on the timbral envelope, or dynamics of the harmonic spectrum, than on the harmonic content (static wave-shape) of a tone.

- Attack time: 2mS. to 4sec.  
 Decay time: 2mS. to 2sec.  
 Sustain level: 0v. to +10v.  
 Release time: 2mS. to 2sec.  
 Gate Input Impedance: 100K ohms  
 Trigger Input Impedance: 20K ohms  
 Output Impedance: 1K ohms  
 Power Consumption: +15v. D.C. @4mA.  
 -15v. D.C. @2mA.



# SAMPLE & HOLD, CLOCK and NOISE SOURCE



The AR-318 is a sophisticated multi-function module. Its three basic elements function independently, allowing more flexible use of sampling and clocking circuitry. Classic Sample & Hold operation latches a new sample of the voltage source appears at the output with the retrigger of each trigger; the Trig input; "Track and Hold" operation uses the Gate input, where the output tracks the voltage source precisely, until the gate is removed, then remains at the last voltage level tracked, until a new gate appears. The Clock may function as an independent low-freq. oscillator, whose pulse output is normalized to the Trig input of the S&H circuit (toggle switch selectable). The Noise Generator includes two forms of filtered noise, Pink and Random (sub-audio) as well as full-spectrum White Noise.

- | Inputs:                         | Level               | Impedance |
|---------------------------------|---------------------|-----------|
| S&H Gate                        | 2v.-10v.            | 100K ohms |
| S&H Trig                        | 2v.-10v.            | 40K ohms  |
| Clock Sync                      | 2v.-10v.            | 80K ohms  |
| Clock FM                        | ±10v.               | 100K ohms |
| S&H In                          | ±10v.               | 200K ohms |
| TRIG. and Sync res.             | positive-going edge |           |
| FM                              | ±1v./octave         |           |
| Gain                            | ±1.0                |           |
| Outputs:                        |                     |           |
| S&H Out                         | ±10v.               | 1K ohms   |
| Drift:                          | 1mV./sec. max.      |           |
| Clock: Square                   | 0-±10v.             | 1K ohms   |
| Sawtooth                        | 0-±10v.             | 1K ohms   |
| Trigger                         | 0-±10v.             | 5K ohms   |
| Clock Frequency Range:          | 3-30Hz              |           |
| White Noise                     | 7V RMS              | 1K ohms   |
| equal energy/octave, 10Hz-16KHz |                     |           |
| Pink Noise                      | 4V RMS              | 1K ohms   |
| equal energy/octave, 10Hz-16KHz |                     |           |
| Random Noise                    | 4V RMS              | 1K ohms   |
| equal energy/octave, 0.4Hz-7Hz  |                     |           |
| Sampling Time:                  | 10 microseconds     |           |
| Power Consumption:              | +15V. D.C. @ 44mA.  |           |
|                                 | -15V. D.C. @ 24mA.  |           |

## VOLTAGE CONTROLLED AMPLIFIER

The AR-318 is a two-quadrant multiplier, allowing dynamic control of the amplitude of a signal, both from the synthesizer and from an external source. The four audio signal inputs are summed together, and two of these have independent level controls. The same applies to control inputs, where only one input has a level control. The control signals are again summed with the Initial Gain voltage level. The audio signals are then multiplied by the control voltages, in either linear or exponential fashion. In ordinary usage, sub-audio or D.C. control voltages, such as those from the ADR, are used to control signal amplitude. Some interesting timbral effects may be obtained by using audio-frequency voltages at the control inputs for high-frequency amplitude modulation.

Maximum Signal Input:  $\pm 10\text{v}$ , p-p.  
Maximum Control Input:  $\pm 10\text{v}$ .  
Gain: 0db to -100 db.  
Frequency Response: D.C. to 30 KHz (1-3db)  
Linear Control: Gain = control voltage/10  
Exponential Control:

$$\text{Gain} = \frac{10e - 10}{2} = 10(e - 10) \text{ db}$$

Input Impedance: 50K ohms min.  
Output Impedance: 1K ohms  
Controls: Signal level 1, Signal level 2,  
Initial Gain Control level 1,  
Mode Switch Linear or  
exponential  
Connections: 4 Signal Inputs  
4 Control Inputs  
2 Outputs

Power Consumption: +15v, D.C. @6mA.  
-15v, D.C. @6mA.



The AR-315 is a four-quadrant voltage multiplier. The voltage present at Input X is multiplied by the voltage at Input Y. If both inputs are in the audio frequency range, the resultant output is a signal whose frequency spectrum components consist of the sum and difference frequencies of the fundamentals and harmonics of the input signal. These are commonly used to produce bell and gong-like tones.

The module is D.C. coupled; when a control signal is applied to one input, and an audio signal to the other, the AR-315 can function as a VCA.

Both X and Y inputs have isolated attenuators. Two floating attenuators are provided in this module — these are not electrically associated with the Balanced Modulator, and may be used anywhere in a patch where extra attenuation is needed. Also within this panel is another 4-jack "patch" or multiplex.

Frequency Response: D.C. to 20 KHz (1-3db)  
Maximum Input Level:  $\pm 10\text{v}$ , peak-to-peak  
Signal-to-Noise Ratio: 80db  
Signal Feed-through: less than 1%, X and Y inputs  
Input Impedance: 20K ohms, X and Y inputs  
Output Impedance: 1K ohms



## BALANCED MODULATOR

# HEX ATTENUATOR

The AR-321 consists of six floating attenuators. Input to attenuator 1 can be normalized to 2 or more attenuator inputs to allow multiple use of a single control signal with independent attenuation for each output. This module does not require a back frame or p.c. card assembly, as all necessary circuitry is contained on the panel. (No edge connector, no power consumption — look, ma! six hands!)



# DUAL MIXER

The AR-323 may be used both as an audio mixer and as a control voltage processor. Each mixer has 4 inputs, two of which have level controls and polarity switches. This allows both addition and subtraction of waveforms, envelopes or other signals, as well as variable gain inversion. Each mixer has an independent output. In addition, there are sum (A+B) and difference (A-B) outputs, which allows use of the module as a single 8-input mixer. Matrix stereo effects may be obtained by applying the sum and difference outputs to left and right channels respectively.

Inputs: 4 inputs to Mixer A; 4 inputs to Mixer B

Input Level:  $\pm 10V$

Outputs: 1 — Mixer A; 1 — Mixer B; 1 — A+B; 1 — A-B

Frequency Response: D.C. to 50KHz ( $-3dB$ )

Input Impedance: 100K ohms

Output Impedance: 1K ohms

Controls: Gain controls 1 & 2, each mixer

Polarity switch (+ or -) 1 & 2, each mixer

Connectors: A inputs 1, 2, 3, 4;

B inputs 1, 2, 3, 4;

Outputs A; B; A + B; A - B

Power Consumption:  $\pm 15V$  D.C. @12mA,

$\pm 15V$  D.C. @12mA.



See Figures 1a & 1b, page 12.

The AR-331 features a preassembled, tested sub-module which provides the Pre-Amp and Envelope Follower circuitry. Assembly involves a dozen additional components and wiring front panel controls and jacks.

The AR-331 is a multi-function module incorporating a 40db pre-amp for tape recorded, microphone, and electric instrument signals; a linear envelope follower and inverter, and a compressor or threshold detector circuit which produces a gate output as long as the input is above the threshold level. Pre-amp output is 'normally' connected to Envelope Follower input; Envelope Follower output 'normally' connected to inverter and Threshold Detector. These connections are deferred by a jack inserted to the appropriate plug.

**Pre-Amp Inputs:** Multiple connections: 1/4" phone, RCA (phono) and mini (1/8") phone for easy interfacing to external sources. Capacitively (AC) coupled.

**Controls:** Input Level Attenuator  
**Output:** +40db (x100) above input signal  
**Envelope Follower:**

**Inputs:** 1. attenuator  
1v. p.-p. input produces 10v. DC output  
Direct Coupled

**Outputs:** Full-wave Rectifier Output  
Linear Envelope Output

**Inverter:** Unity Gain (max.) w/ Input Attenuator

**Threshold Detector: (Comparator)**  
**Input:** 0-+10v. (positive comparison only)

"ON" Threshold Level: variable from .25v. to +15v.

**Threshold Hysteresis:** .25v.  
Signals below threshold level do not produce gate.  
Signals above threshold level produce a gate.

## PRE-AMP/ENVELOPE FOLLOWER

**Input Impedance:** 50K min., except threshold signal input - 10K  
**Output Impedance:** 1K ohms, except Gate Out: 330 ohms, and Trig Out: 3.3K ohms  
**Power Consumption:** +15v. @15mA., -15v. @12mA.

The Gentle Electric Model 101 is represented by Aris, and will be available in standard module form later this year. It is designed to accurately track an input from instrument or microphone sources to produce a 1v/octave control voltage for synthesizers over a range of 25Hz to 10KHz. It also includes:

Linear and Logarithmic envelope followers

Infinite compression — a signal output that remains at a constant, synthesizer-compatible amplitude, regardless of input amplitude

Low-noise mic pre-amp, which can be used independently and accepts microphones or instrument pickups

Track and Hold operation on the pitch follower, controlled by a footswitch, synthesizer, or panel switch

A Pulse wave output at the fundamental input frequency. Pulsewidth is controlled by input waveform.

The GE 101 is an ideal alternative to keyboard control for those musicians who play other instruments or who wish to experiment with combinations of synthesis and acoustic music.

### Specified Input Level

(SIL): 0db into TI into LINE IN or -40db into MIC IN w/Line Level control set for 0db atten.

Overhead (noise of clipping): 0db above SIL

Overhead Indication: 0db above SIL

Pre-Amp Gain: 40db

Compressor Out: 10v. p.-p. (trimmable)

Threshold of Compression: 40db below SIL

Gate Threshold: on: 20db below SIL;

off: 23db below SIL (3db hysteresis)

Gate Output: 0v. (off) when sig. is below

gate threshold

10v. (on) when sig. is above

gate threshold

Trigger Output: 3vS. pulse to 10v. when

either Gate output goes on

Off when sign. amplitude increases

at a rate exceeding that which is set up by the

RETRIGGER control.

Linear Env. Output: proportional to following

peak amplitude (5v. nom. for SIL)

Log Env. Output: 1v. change for 10v.

change in amplitude (10v. nom. for SIL)

Pitch: 1v/OCT Output: When signal is above

gate threshold, this follows extracted

fundamental pitch at 1v/OCT (trimmable).

When signal is below threshold

(or when HOLD function is activated)

it holds the last pitch received.

HOLD Drift: lat Pitch: 1v/OCT output less

than 22mV (1.3%) per minute.

## PITCH and ENVELOPE FOLLOWER

(not shown)

The AR-317 generates all the basic synthesizer waveforms simultaneously: sawtooth, triangle, variable width pulse (square) and sine. An exceptionally well-engineered sine converter provides a pure, low-distortion sine wave allowing very clean balanced modulation. The AR-317 uses exponential frequency control providing five-octave control of frequency over the entire audio range. Control voltage inputs are summed; each positive volt doubles the frequency, and each negative volt halves it, over an extremely wide range (negative control voltage may be used to drive down as low as .002Hz, positive as high as 50KHz).

- Frequency Range: (Manual Control)  
0.02Hz — 20Hz low range  
16Hz — 16KHz high range
- Control Input Level:  $\pm 10$ u max.
- Sync Input: positive-going edge causes all waveforms to reset
- Sync Input Level: 2v. min. — 10v. max.
- Pulse Width: variable 0 to 100% of duty cycle (50% = square wave)
- Pulse Width Modulation: 10% per volt at input. Max. input  $\pm 10$ v.
- Input Impedances: 50K ohms min.
- Output Impedance: all outputs, 1K ohms
- Controls: Course Frequency, Fine Frequency (1/12 octave)
- Connectors: 4 control inputs (1 w/stereo) Sync. Input, Pulse Width Modulation Input
- Four Waveform Outputs
- Power Consumption:  $\pm 15$ v. D.C. @ 68mA.;  $-15$ v. D.C. @ 36mA.

See Figure 2, page 12



## DUAL SAWTOOTH/PULSE VCO

The AR-332 features two pre-assembled and tested voltage controlled sawtooth generators. This simplifies greatly the time required for successful assembly.

The AR-332 is two fully independent sawtooth/pulse VCO's. These waveforms have the highest harmonic content of all the basic synthesizer signals, and though the AR-332 omits the triangle and sine wave outputs, it is in all other respects like two AR-317's and offers a savings of costs and space over that module. One oscillator of the AR-332 is "normally" sync'd to the other — this is defeated by the insertion of a dummy plug into the sync input jack.

See Figure 3, page 12



All spec's like AR-317, except:

- Controls: Dual concentric potentiometers for all controls. Each oscillator has course and fine freq. control. Control signal input attenuator and pulse width setting. Higher-Low Range switch.
- Output levels: 0v. to  $\pm 10$ v., both sawtooth and pulse
- Power Consumption:  $\pm 15$ v. @ 12mA.;  $-15$ v. @ 25mA.

## DUAL LFO, LAG, and INVERTER

The AR-334 is a multi-function module providing control voltage signal sources and signal processors. The two low-frequency oscillators have independent manual frequency controls, provide three simultaneous waveform outputs each, and are syncable. The LAG circuit is a 60b-per-octave lowpass filter, with a variable, very low cut-off frequency. The LAG is used to limit the rate of change of a control signal, like the portamento circuit in the AR-313 Keyboard Control, or to "round off" the edges of a low frequency pulse to produce a useful envelope.

- LFO's:
- Frequency range: 0.2Hz to 30Hz
- Output Waveforms: Sawtooth: 0v. to  $\pm 10$ v.; Square: 0v. to  $\pm 10$ v.; Triangle:  $-5$ v. to  $+5$ v. positive-going edge
- Sync Input:  $\pm 10$ v. min. to 10v. max.
- Sync Input Impedance: 47K ohms
- LAG:
- Gain: 1.0
- Lag Time: variable, 1ms. to 1 sec.
- Input Impedance: 1K ohms at min, 1M ohms at max, Lag  $\pm 10$ v. max.
- INVERTER:
- Gain: variable, 0 to  $-1.0$
- Input Level:  $\pm 10$ v. max.
- Input Impedance: 1K ohms min.
- Output Impedance: 1K ohms, all outputs
- Controls: LFO-2 frequency, LAG time, INVERTER gain
- Connectors: LFO-1: Sync In, Sawtooth Out, Square Out, Triangle Out, LFO-2: same as LFO-1, LAG In, LAG Out, INVERTER In, INVERTER Out.
- Power Consumption:  $\pm 15$ v. D.C. @ 48mA.;  $-15$ v. D.C. @ 20mA.





## VOLTAGE-CONTROLLED LP FILTER



The AFR-014 is a basic 12db-octave low pass filter with voltage-controlled cut-off frequency and variable-resonance (Q). This filter modifies the harmonic content, or spectrum, of an incoming signal by damping all frequency components of the waveform above a certain cut-off point. The resonance control boosts the amplitude of the frequency or harmonic of the incoming wave, closest to the cut-off frequency, by a variable amount according to the manual setting. The control input mixes the cut-off frequency at 1 octave per volt of input signal: positive voltage will raise the cut-off and negative voltage will lower it.

Frequency Response: 10Hz to 100kHz  
Q (Gain at Cut-Off Freq.): 0.9 to 50  
Maximum Signal Level:  $\pm 10V_{\text{peak}}$   
Signal-to-Noise Ratio: 70dB min.  
Control Input:  $\pm 10V_{\text{V}}$  On/Off/Active  
Signal Input Impedance: 80K ohms min.  
Control Input Impedance: 80K ohms min.  
Output Impedance: 1K ohms  
Controls: Initial Freq. Resonance (Q), Signal  
1 Input Attenuator Control 1 Input  
Attenuator  
Connectors: 4 Signal Inputs  
4 Control Inputs  
2 Outputs  
Power Consumption:  $\pm 15V_{\text{D.C.}}$  620mA,  
 $\pm 15V_{\text{D.C.}}$  600mA.

Power Consumption (ph): +15v. D.C. @25mA,  
-5V. D.C. @75mA.

## MULTIMODE VC FILTER

The AR-327 is a voltage controller, state variable filter with dual-mode HIGHPASS, LOWPASS, BANDPASS, and switch-selectable NOTCH or PEAK outputs. It also features extremely high, voltage-controllable Q without filter oscillation; exclusive dynamic Q limiting prevents overloading even at full signal input levels and high Q setting. Q voltage control input varies the amount of resonance, resonant frequency is determined by the cut-off setting or freq. control input). The various filter outputs may be mixed to achieve complex timbres and soundshapes. These functions are also similar to studio equalization, and may be used for master system equalization. Phasing sounds may be achieved by sweeping the cut-off freq. while using the NOTCH out.

Frequency Response: 10Hz - 20KHz  
Signal-to-Noise Ratio: 70dB  
Distortion: less than 0.05% typically  
Q (Gain at Cut-Off Freq.): 0.5 to 512  
Signal Levels:  $\pm 10$  volts



Input Impedance: 50K ohms  
Output Impedance: 1K ohms, all outputs  
Controls: Initial Kick-Off freq., Resonance  
Audio 1 Input Attenuator  
Freq. Control 1 Input Attenuator  
NOTCH or PEAK switch select  
Connectors: 3 Audio Signal inputs  
2 Freq. Control Inputs  
2 G. Control inputs  
1 NOTCH or PEAK output  
1 LOWPASS output  
1 HIGHPASS output  
1 BAND PASS output  
Power Consumption: 115v, D.C. @15mA;  
15v, D.C. @170mA.

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these, I think, are important. "Self" and "Other" are concepts outside the sphere of moral and political justice. They are thus distinguished from the last sentence of MLJ: "no man of peace and courage will... show regard for the self alone." MLJ is always of peace and courage with others, not the self.

## PHASE I/FLANGE

The AR-329 is a voltage-controlled phaser. Usually phasers work on phrasing in a spatial effect — swooshing, jet-sounds, etc. Very few people have had a chance to use a phaser that isn't controlled by an internal oscillator, so fail to discover that a phaser can be a uniquely effective timbral modifier. The AR-329 has a manual center frequency control to set the initial center frequency of its 4-to-5-pole/okt frequency response curve, and a manual center resonance control which can bring this very stable device to the brink of self-oscillation (bringin' on the smallest input signal). Two input attenuators, one for ALL 4 audio signal inputs, and one for the first exponential control input complete the control possibilities.

The control input sensitivities available make this an extraordinarily flexible unit. The first 2 control inputs are exponentially sensitive, one fixed to f<sub>oct</sub>, and the second attenuatable. These are used for the standard phasing effect where a sine or triangle is applied to control frequency. With this keyboard control voltage applied the AR-329 becomes a voltage-controlled formant filter producing four or five formant peaks whose relationship is fixed. Using this *see*, the 329 is a unique timbral modification. The f<sub>oct</sub> input is primarily designed to be used with envelope follower outputs, and moves the phase frequency as the amplitude of the followed signal changes. The f<sub>amp</sub> input has a reciprocal sensitivity whose response simulates the response of a swept flange, which slows the sweep up to infinity as an over-intensity rate. The EVEN mode has four formant peaks and produces a "Tet" sound rich in high and low harmonics. The ODD mode has six formant peaks, and produces a thinner, reedy sound.

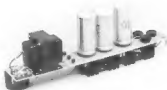
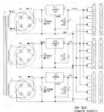
Input Impedances: 50K ohms  
Output Impedances: 1K ohms  
Power Consumption: +15v, D.C. @12mA,  
-15v, D.C. @11mA

See Figure 4, page 12.



# POWER SUPPLY

No, this is not a New Jersey oil refinery. The AR-322 has enough muscle, though, to drive approximately 50 series 300 modules, providing +15 volts, -15 volts, and -5 volts, at 1 Amp each. It is well-regulated to insure stability and tuning accuracy of your synthesizer.



## OUTPUT & POWER

The AR-322 handles the basic output and power interface requirements of any Aris system. It receives two input signals from the synthesizer and produces output signals appropriate for use with standard stereo system equipment or musical instrument amplifiers, IFCA-phono jacks! These outputs will also drive high-impedance (600 ohm) speakers directly. A stereo headphone (1/4" phone) jack is also provided. D.C. voltages of +15v, and -15v, are provided via the front panel jacks, in are two 4-jack multiplexers. Two input level controls and Power on/off switch are included.



## STEREO REVERB & OUTPUT

The AR-322 incorporates all of the functions of the AR-328 Output and Power, and then adds several features to produce a module of significantly increased musical presence.

Each of the two input signals which can be accommodated is split, fed to an attenuator for level control, then to a pan pot for placement of the dry, unreverberated signal anywhere in the stereo field, and fed to the reverb network: a pot at the beginning of the reverb network allows continuous panning from input 1 only to the reverberation devices to input 2 only. A second dual concentric pot gives independent control of the reverb level on each output channel. Two independent CASCADE REVERBERATION DEVICES by D.C. Electronics give more spaciousness and realism than the signal delay devices found on many synthesizers. These reverbs are spring type delay lines, but sound significantly better than other springs we've heard.

- Input Impedances: 50K nominal
- Output Impedance: 220 ohm minimum
- Input Signal Level: 20v, a-b, for optimum s/n
- Signal-to-Noise Ratio: better than 100db
- Controls: 2 Input Attenuators (1 ea. channel)
- 7 pan pots (1 ea. channel)
- 1 Reverb source per pot
- 1 Dual concentric Reverb Level pot.
- Power Consumption: +15v, D.C. @39mA, -15v, D.C. @27mA.





# BASIC PATCH SYSTEM I

AR-340: AR-322, AR-316: AR-333, AR-314, AR-326, AR-312, AR-311, 313, 320 Keyboard Group



The four sample systems shown here are intended not as definitive "What you ought to buy" systems, but as four different, viable instruments. Even a single entry level system can add up to a moderate size instrument of great versatility. Arps is fully committed to the modular concept because a musician/composer knows what kind of instrument will best meet his or her expanding needs, and a fully modular system allows optimum fulfillment of a diverse spectrum of musical needs and desires.



## SYSTEM

AR-310, AR-322, AR-312(2), AR-314(2), AR-316, AR-318, AR-323, AR-324, AR-328, AR-329, AR-315 Keyboard group

SAMPLE SYSTEMS



#### SYSTEM II

AR-320; AR-322; AR-323; AR-317; AR-332; AR-327; AR-316; AR-318; AR-319; AR-323;  
AR-324; AR-326; AR-328; AR-331; AR-314; AR-311, 313 Keyboard



#### SYSTEM IV

AR-310; AR-322; AR-340; AR-313 (2); AR-314; AR-316 (2); AR-318; AR-317 (2); AR-319;  
AR-322; AR-324; AR-327 (2); AR-328; AR-329; AR-331; AR-332; Keyboard Group

**ATTENUATE** — reduce amplitude or signal level

**AUDIO SIGNAL** — within the frequency range of human hearing (approx. 16Hz — 16000Hz)

**CONTROL VOLTAGE** — any signal used as a control input (generally, but not necessarily, sub-audio)

**DECTAVE** — change in signal level (decibels) per octave (frequency)

**D.C.** — Direct Current, or a voltage with no periodic, fluctuating component

**ENVELOPE** — contour of an audio, or other, in terms of changing amplitude or harmonic structure for the duration of the event

**ENVELOPE FOLLOWER** — device which produces a D.C. voltage directly proportional to the amplitude contour of an input signal

**FORMANT** — a characteristic resonance in an instrument or voice, regardless of frequency

**FREQUENCY** — cycles-per-second (times of fluctuation)

**Gate** — signal used to 'gate' — that is, to turn ON or OFF a circuit (switch is OFF or CLOSED when gate is not present). A duration signal.

**HARMONIC** — frequency component of a signal that is above the fundamental, or lowest frequency. Usually a signal contains several harmonics, in a particular order, or series.

**IMPEDANCE** — electrical resistance, measured in OHMS

**Kc** — Hertz, equal to cycles per second (frequency)

**K** — Kilo, or one thousand (as in 1K ohms, or 1600KHz)

**MULTIPLE** — a set of connectors shared together, so that a signal going in to one connector will appear as an output at all other connectors of the multiple

**POLARITY** — positive or negative nature of a voltage or signal. A signal that is inverted changes to the opposite polarity.

**PULSE WIDTH** — percentage of peak voltage, or 'on' area, in the duty cycle of a pulse wave

**RESONANCE** — an exaggerated or sympathetic frequency (every acoustic instrument has resonances in its material, be it wood, brass, or strings). A synthesizer filter can be made to resonate at a specific frequency chosen as center or cut-off

**SAMPLE** — to look at the voltage state of a signal at any particular instant with the appropriate timing circuit

**SLUR** — to slow the rate of change of a signal (important to LAD and PORTAMENTOS)

**SPECTRUM** — as in frequency spectrum; usually denotes the harmonic content of a signal

**TIMBRE** — aural texture of a sound; brass instruments have a 'bright' timbre, wind instruments a 'nasal' timbre. Relates directly to waveform and harmonic spectrum in synthesis.

**TRACE** — to follow and reproduce a signal without altering it

**TRIGGER** — a short, rarely instantaneous signal or spike, rising from 0v. to some positive voltage and returning to 0v. An initiation signal.

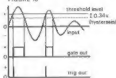
## FIGURES

AR-371 PRE AMP ENVELOPE FOLLOWER

FIGURE 1a

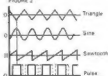


FIGURE 1b



AR-371 OSCILLATOR

FIGURE 2



AR-371 DUAL OSCILLATOR

FIGURE 3



AR-371 PHASE F LANGE

FIGURE 4



# ORDERING INFORMATION

## Credit

Membership orders accepted

Credit extended only to accredited educational institutions

Terms - Net 30-days

## C.O.D.

C.O.D. orders must be accompanied by a minimum 50% deposit

## International Orders

From Canada, send U.S. funds

Outside U.S. and Canada, send International Money Order

## Delivery Time

Assembled System: 6 weeks delivery

Note: Usually sent in two or three shipments, 1 or 2 weeks apart. Consult factory for special delivery requirements

## Discount

Quantity Discount:

Orders over \$1000. — take 5% off total price

Orders over \$3000. — take 10% off total price

## Order Form

Please send this form if you wish to receive price list

Number	Description	Kit price	Wired price	Weight	Quantity	Kit or Wired
AR-310	Basic Cabinet (11 module space) .....	\$ 82.00	\$156.00	20 lbs.		
AR-330	Integral Cabinet (14 modules & 3rd) .....	1	\$360.00	60 lbs.		
AR-340	Mini-cabinet (7 module space) .....	\$ 85.00	\$ 75.00	14 lbs.		
AR-311	Five Octave Keyboard .....	\$118.00		18 lbs.		
AR-312	Keyboard Interface Electronics .....	\$ 82.00	\$276.00	3 lbs.		
AR-320	Keyboard Cabinet .....	\$ 52.00		14 lbs.		
AR-313	ADSR Envelope Generator .....	\$ 81.00	\$110.00	3 lbs.		
AR-314	Lowpass Voltage Controlled Filter .....	\$111.00	\$184.00	3 lbs.		
AR-315	Balanced Modulator .....	\$ 86.00	\$121.00	3 lbs.		
AR-316	Voltage Controlled Amplifier .....	\$ 88.00	\$121.00	3 lbs.		
AR-317	Four Waveform V. C. Oscillators .....	\$126.00	\$183.00	3 lbs.		
AR-318	Sample & Hold, Noise, V. C. Clock Module .....	\$ 71.00	\$121.00	3 lbs.		
AR-321	Pre-Amp & Envelope Followers .....	\$166.00	\$216.00	3 lbs.		
AR-321	Hex Amplifier .....	\$ 45.00	\$ 72.00	3 lbs.		
AR-322	Power Supply .....	\$ 83.00	\$132.00	8 lbs.		
AR-323	Dual Mixer .....	\$ 71.00	\$121.00	3 lbs.		
AR-324	Dual Low Frequency Oscillator .....	\$ 71.00	\$122.00	3 lbs.		
AR-325	Power & Output .....	\$ 47.00	\$ 88.00	3 lbs.		
AR-327	Multi-mode V. C. Filter .....	\$156.00	\$248.00	3 lbs.		
AR-328	Stereo Filter and Output .....	\$156.00	\$236.00	6 lbs.		
AR-329	Phase/Frequency Modulator .....	\$156.00	\$236.00	3 lbs.		
GE-101	High & Envelope Followers .....	1	\$146.00	7 lbs.		
AR-332	Dual Stereo/Filter V. C. Oscillator .....	\$179.00	\$286.00	4 lbs.		

User's Manual .....

Documentation (Box) .....

All prices F.O.B. Salem, Ma.

Not Available in kit form.

Include allowance for UPS shipping, or contact us for details

NAME .....

PHONE .....

TOTAL

ADDRESS .....

**ARIES MUSIC**  
Salem, Massachusetts



**ARIES MUSIC**  
INCORPORATED

BOX 3069 SALEM, MASSACHUSETTS 01970